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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/700,833	06/07/2001	Olaf Duebel	11150/29	2893
26646	7590	04/19/2004	EXAMINER	
KENYON & KENYON ONE BROADWAY NEW YORK, NY 10004			CREPEAU, JONATHAN	
			ART UNIT	PAPER NUMBER

1746

DATE MAILED: 04/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/700,833

Applicant(s)

DUEBEL ET AL.

Examiner

Jonathan S. Crepeau

Art Unit

1746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 January 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 17-42 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 17-42 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☒ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 3.8.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This Office action addresses claims 17-40 and newly added claims 41 and 42. Claims 17-31 remain rejected for substantially the reasons of record. Additionally, all the claims are newly rejected under 35 USC §102 and §103 herein. However, as the new grounds of rejection of claims 17-31 were not necessitated by amendment, this action is non-final.

Information Disclosure Statement

2. Per Applicant's request, the initialed IDS sheets filed on 11/20/00 and 6/7/01 are being re-sent with this communication.

Oath/Declaration

3. The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because:

Non-initialed and/or non-dated alterations have been made to the oath or declaration (in particular to inventor Jessica Reinkingh's address). See 37 CFR 1.52(c).

Claim Objections

4. Claim 41 is objected to because of the following informalities: in line 2, "covert" should be "convert." Appropriate correction is required.

5. Claims 41 and 42 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The subject matter of claims 41 and 42 does not appear to further limit the subject matter of the parent claims in a meaningful way. Correction or clarification is required.

Claim Rejections - 35 USC § 102

6. Claims 17, 19, 30, 31, and 41 are rejected under 35 U.S.C. 102(e) as being anticipated by Kawatsu et al (U.S. Patent 6,120,925).

Regarding claim 17, the reference is directed to a fuel cell system comprising a reformer unit (32), a fuel cell unit (20), and a CO selective oxidation device (34) disposed between the reformer unit and the fuel cell unit (see Fig. 1). As shown in Figures 7 and 8 and described in column 14, line 46 et seq., a water injection device (80) is disposed at the oxidation device and is configured to inject water therein. Regarding claims 19 and 30, the material to be reformed is

Art Unit: 1746

liquid methanol (see col. 10, line 44). Regarding claims 17 and 41, the injected water is capable of oxidizing CO into CO₂.

Thus, the instant claims are anticipated.

7. Claims 17-19, 30-33, and 39-42 are rejected under 35 U.S.C. 102(e) as being anticipated by Grot et al (U.S. Patent 6,001,499).

Regarding claim 17, 18, 32, and 33, the reference is directed to a fuel cell system comprising a reformer unit, a fuel cell unit, and a CO oxidation device (i.e., shift reactor) disposed between the reformer unit and the fuel cell unit (see col. 1, line 53 et seq.). Regarding claims 17, 18, 32, 33, and 34, water (steam) is injected into the shift reactor (see col. 2, line 24). Regarding claims 19, 30, 39, and 40, the material to be reformed is liquid methanol (see col. 1, line 54). Regarding claims 17, 18, 32, 33, 41, and 42, the water oxidizes CO into CO₂ (see col. 2, line 20). Regarding claims 18 and 33, the system can be used in a motor vehicle (see col. 1, line 20).

Thus, the instant claims are anticipated.

Claim Rejections - 35 USC § 103

8. Claims 17, 22-25, and 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buswell et al (U.S. Patent 5,630,679) in view of Kawatsu et al.

Regarding claims 17 and 28, Buswell et al. is directed to a fuel cell system comprising a reformer unit (168), a fuel cell unit (186), and a CO selective oxidation device (142) disposed between the reformer unit and the fuel cell unit (see Fig. 1). Regarding claim 30, the raw material is a hydrogen-containing material such as natural gas (see col. 7, line 38). Regarding claims 22, 28, and 29, the system comprises a two-stage compressor (130, 134) configured to supply compressed air to a cathode of the fuel cell unit (see col. 6, line 50 et seq.). Regarding claim 28, expanders are disposed in the cathode exhaust stream and are connected to the compressors via common shafts (see Fig. 1). Regarding claims 23 and 24, the system comprises water separators (i.e., condensers) (188, 189) disposed in the cathode and anode exhaust streams. The separated water is supplied to a point upstream of the reformer (see col. 8, lines 12-16). Regarding claim 25, a water circulation loop (42, 43) is configured to cool the fuel cell (see Fig. 1).

Buswell et al. do not expressly teach that the selective oxidation unit comprises a water injection device, as recited in claims 17 and 28.

As set forth above, Kawatsu et al. teach a selective oxidation unit comprising a water injection device.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use the selective oxidation unit of Kawatsu et al. in the system of Buswell et al. In the abstract, Kawatsu et al. teach the injection of water into their oxidation unit "enhances the cooling efficiency and enables all the selective CO oxidizing catalysts 50 stored in the selective CO oxidizing unit 34 to

Art Unit: 1746

be maintained in the active temperature range, thus sufficiently reducing the concentration of carbon monoxide included in a resulting gaseous fuel.” Accordingly, the artisan would be motivated to use the selective oxidation unit including the water injection device of Kawatsu et al. in the system of Buswell et al.

9. Claims 17-21, 30, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Negishi (U.S. Patent 6,165,633) in view of Kawatsu et al.

Regarding claims 17, 18, and 20, Negishi is directed to a fuel cell system comprising a reformer unit (31), a fuel cell unit (40), and a CO selective oxidation device (26) disposed between the reformer unit and the fuel cell unit (see Fig. 1). Regarding claims 19, 30, and 31, the material to be reformed is liquid methanol (see col. 12, line 2). Regarding claim 18, the system includes a drive system of a motor vehicle (see col. 10, line 62). Regarding claims 20 and 21, the reformer includes a mixer configured to mix the methanol and an oxygen-containing substance (e.g., air) (see Fig. 1; col. 17, line 38 et seq.).

Negishi do not expressly teach that the selective oxidation unit comprises a water injection device, as recited in claims 17, 20, and 28.

As set forth above, Kawatsu et al. teach a selective oxidation unit comprising a water injection device.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use the

selective oxidation unit of Kawatsu et al. in the system of Negishi. In the abstract, Kawatsu et al. teach the injection of water into their oxidation unit “enhances the cooling efficiency and enables all the selective CO oxidizing catalysts 50 stored in the selective CO oxidizing unit 34 to be maintained in the active temperature range, thus sufficiently reducing the concentration of carbon monoxide included in a resulting gaseous fuel.” Accordingly, the artisan would be motivated to use the selective oxidation unit including the water injection device of Kawatsu et al. in the system of Negishi.

10. Claims 17-19, 26, 27, 30, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pettit (U.S. Patent 6,077,620) in view of Kawatsu et al.

Regarding claims 17, 18, and 26, Pettit is directed to a fuel cell system comprising a reformer unit (2), a fuel cell unit (16), and a CO selective oxidation device (14) disposed between the reformer unit and the fuel cell unit (see Fig. 1). Regarding claims 19, 30, and 31, the material to be reformed is liquid methanol (see Figure 1). Regarding claim 18, the system includes a drive system of a motor vehicle (see col. 1, line 44; col. 3, line 52). Regarding claim 26, a catalytic burner (28) is configured to combust exhaust gas (20) from the anode and to direct waste heat to the reformer via line 32 (see Fig. 1). Regarding claim 27, the burner is connected to a supply tank for supplying raw methanol (50) (see Fig. 1).

Pettit does not expressly teach that the selective oxidation unit comprises a water injection device, as recited in claims 17, 18, and 26.

As set forth above, Kawatsu et al. teach a selective oxidation unit comprising a water injection device.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use the selective oxidation unit of Kawatsu et al. in the system of Pettit. In the abstract, Kawatsu et al. teach the injection of water into their oxidation unit “enhances the cooling efficiency and enables all the selective CO oxidizing catalysts 50 stored in the selective CO oxidizing unit 34 to be maintained in the active temperature range, thus sufficiently reducing the concentration of carbon monoxide included in a resulting gaseous fuel.” Accordingly, the artisan would be motivated to use the selective oxidation unit including the water injection device of Kawatsu et al. in the system of Pettit.

11. Claims 17, 22-25, 28-30, 32, 34-37, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buswell et al. in view of Grot et al.

Regarding claims 17, 28, and 32, Buswell et al. is directed to a fuel cell system comprising a reformer unit (168), a fuel cell unit (186), and a CO oxidation device (shift reactors 172, 176) disposed between the reformer unit and the fuel cell unit (see Fig. 1). Regarding claims 30 and 39, the raw material is a hydrogen-containing material such as natural gas (see col. 7, line 38). Regarding claims 22, 28, 29, and 35, the system comprises a two-stage compressor

(130, 134) configured to supply compressed air to a cathode of the fuel cell unit (see col. 6, line 50 et seq.). Regarding claim 28, expanders are disposed in the cathode exhaust stream and are connected to the compressors via common shafts (see Fig. 1). Regarding claim 37, the exhaust gas (24) from the fuel cell anode is burned in a burner (29) and the generated heat is supplied to the reforming process (see col. 8, line 29). Regarding claims 23, 24, and 36, the system comprises water separators (i.e., condensers) (188, 189) disposed in the cathode and anode exhaust streams. The separated water is supplied to a point upstream of the reformer (see col. 8, lines 12-16). Regarding claim 25, a water circulation loop (42, 43) is configured to cool the fuel cell (see Fig. 1).

Buswell et al. do not expressly teach that the shift reactor unit comprises a water injection device, as recited in claims 17, 28, and 32.

As set forth above, Grot et al. teach a shift reactor unit comprising a water injection device.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use the shift reactor unit of Grot et al. in the system of Buswell et al. In column 2, line 23, Grot et al. teach that “[d]epending upon the reformat flow rate and the steam injection rate, the carbon monoxide content of the gas exiting the shift reactor can be as low as 0.5 mole %.” As such, the artisan would be motivated to use the shift reactor of Grot et al. in the system of Buswell et al. in hopes of reducing CO content.

Art Unit: 1746

12. Claims 17-19, 26, 27, 30, 31, 33, 35, 38, 39, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pettit in view of Grot et al.

Regarding claims 17, 18, 26, 32, 33, and 38, Pettit is directed to a fuel cell system comprising a reformer unit (2), a fuel cell unit (16), and a CO oxidation device (i.e., shift reactor) (12) disposed between the reformer unit and the fuel cell unit (see Fig. 1). Regarding claims 19, 30, 31, 39, and 40, the material to be reformed is liquid methanol (see Figure 1). Regarding claims 18 and 33, the system includes a drive system of a motor vehicle (see col. 1, line 44; col. 3, line 52). Regarding claims 26, 37, and 38, a catalytic burner (28) is configured to combust exhaust gas (20) from the anode and to direct waste heat to the reformer via line 32 (see Fig. 1). Regarding claims 27 and 38, the burner is connected to a supply tank for supplying raw methanol (50) (see Fig. 1). Regarding claim 35, compressed air is supplied to the fuel cell cathode (see Fig. 1).

Pettit does not expressly teach that the shift reactor unit comprises a water injection device, as recited in claims 17, 18, 26, 32, 33, and 38.

As set forth above, Grot et al. teach a shift reactor unit comprising a water injection device.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use the shift reactor unit of Grot et al. in the system Pettit. In column 2, line 23, Grot et al. teach that “[d]epending upon the reformat flow rate and the steam injection rate, the carbon monoxide content of the gas exiting the shift reactor can be as low as 0.5 mole %.” As such, the artisan

would be motivated to use the shift reactor of Grot et al. in the system of Pettit in hopes of reducing CO content.

Response to Arguments

13. Applicant's arguments filed January 30, 2004 have been fully considered but they are not persuasive insofar as they apply to the present rejections. Applicants urge that Kawatsu does not teach that the injected water actually participates in the chemical reaction to oxidize CO to CO₂. However, it is noted that Kawatsu teaches all the *structural* limitations of apparatus claim 17. The limitations relating to the conversion of CO to CO₂ by the injected water are considered to be functional limitations because they do not further limit the structure of the claimed oxidation device. If a prior art structure is capable of performing a claimed intended use, then it meets the claim (MPEP §2111.03). See also MPEP §2114 (claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function); and §2115 (material or article worked upon does not limit apparatus claims).

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (571) 272-1299. The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

Art Unit: 1746

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski, can be reached at (571) 272-1302. The phone number for the organization where this application or proceeding is assigned is (571) 272-1700. Documents may be faxed to the central fax server at (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jonathan Crepeau
Patent Examiner
Art Unit 1746
April 14, 2004